Remarks

Claims 16, 18 – 20 and 22 - 24 are now pending in this application. Further consideration is requested.

35 U.S.C. § 112 First Paragraph Rejection

In response to the rejection of claim 17 as failing to comply with the written description requirement, claim 17 has been cancelled. Accordingly, withdrawal of this ground of rejection is requested.

35 U.S.C. § 103 Rejections

In response to the rejection of claims 16-20, 23, 24, 26 and 27 as being unpatentable over JP 11-307791 in view of Yamagishi et al., Brandhorst, Jr., Spitzer (all of record) and the instant disclosure, of claims 16-20, 22 and 25 as being unpatentable over Brandhorst, Jr. in view of Mimura et al. (of record) and the instant disclosure, and Mimura et al. in view of Brandhorst, Jr. and the instant disclosure, and of claim 21 as being unpatentable over JP'791, Yamagishi et al., Brandhorst, Jr. Spitzer, the instant disclosure, and Whitehouse (multiple rejections), claim 16 has been amended to more clearly recite the inventive features of the present invention, which are nowhere disclosed or suggested by the prior art.

In particular, the present invention provides a solar cell module with increased light efficiency and high power generation without degradation. In accordance with the invention, a transparent rear surface member is used to increase the amount of light entering the solar cell for production of electric power. In the prior art, such transparent member resulted in increased permeation of water into the module, with resulting degradation of power generation. The present inventors discovered that this undesired degradation is related to diffusion of sodium ions from the front glass surface into the resin when water enters into the module, and subsequent degradation of the semiconductor junction caused by the increased

sodium ion concentration. Accordingly, the present invention solves this discovered problem by forming the semiconductor junction at a location away from or opposite to the incident light transmitting or glass surface.

As shown in Figs. 1 and 2, the p-n junction (between layers 31 and 32, Fig. 1, and between layers 51 and 53, Fig. 2) is formed opposite from the glass surface 1 as opposed to the prior art solar cell module as shown in Fig. 4. Hence, claim 16 has been amended to more explicitly set forth this structure, wherein a specific material in the resin layer containing the sodium and material used for the antireflective coating.

None of the prior art references relied upon in the multiple grounds of rejection, and no combination thereof, discloses such structure. The solar cell element of JP '791 as disclosed in Fig. 2 teaches a p-n junction 13-11 adjacent to the glass layer 3. Brandhorst Jr. discloses the prior art solar cell structure, having a metallic layer 14 at the rear surface. Yamagishi discloses a p-i-n structure 4 adjacent to a glass substrate 1. Spitzer discloses a solar cell with a p-n junction at a rear surface, with a reflector 42 mounted adjacent to the junction, and further fails to disclose any encapsulation of the solar cell element. Mimura et al. discloses a solar cell module having a glass substrate 105 and solar cells 104 encapsulated in a resin 103, with a backside covering member 102 made of TEDLAR film.

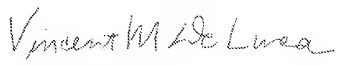
Whitehouse is directed to an antireflective coating composition, however Whitehouse does not specifically describe the material used for the antireflective coating. None of the cited prior art references, and thus no possible combination of the prior art references, discloses or renders obvious a solar cell module as set forth in claim 16, which requires a solar cell element comprising a semiconductor junction structure forming an electric field, a highly doped semiconductor layer formed at one side of the semiconductor junction, and respective electrodes contacting said semiconductor junction structure and highly doped semiconductor layer; an incident light transmitting member made of a glass adhered at a light incidence side of the solar cell element by a resin; and a rear surface member comprising a transparent resin film adhered at a rear surface side of the solar cell element by a resin, wherein the resin for adhering the light incidence side light transmitting member at the light incidence side of the solar cell element contains a sodium ion depositing from the incident light transmitting member, and the solar cell

element is encapsulated in said resin and oriented such that said highly doped semiconductor layer is interposed between said incident light transmitting member and said semiconductor junction structure.

Conclusion

In view of the foregoing, claims 16-24 are submitted to define patentable subject matter over the prior art of record, whether considered individually or in combination. Further and favorable reconsideration of this application, withdrawal of the outstanding grounds of rejection, and the issuance of a Notice of Allowance are earnestly solicited.

Respectfully submitted,



Vincent M DeLuca
Attorney for Applicants
Reg. No. 32,408

NDQM WATCHSTONE LLP
1300 Eye Street, N.W.
Suite 1000 West Tower
Washington, D.C. 20005
202-659-0100